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PLASTER-OF-PARIS IN ORTHOPEDICS.

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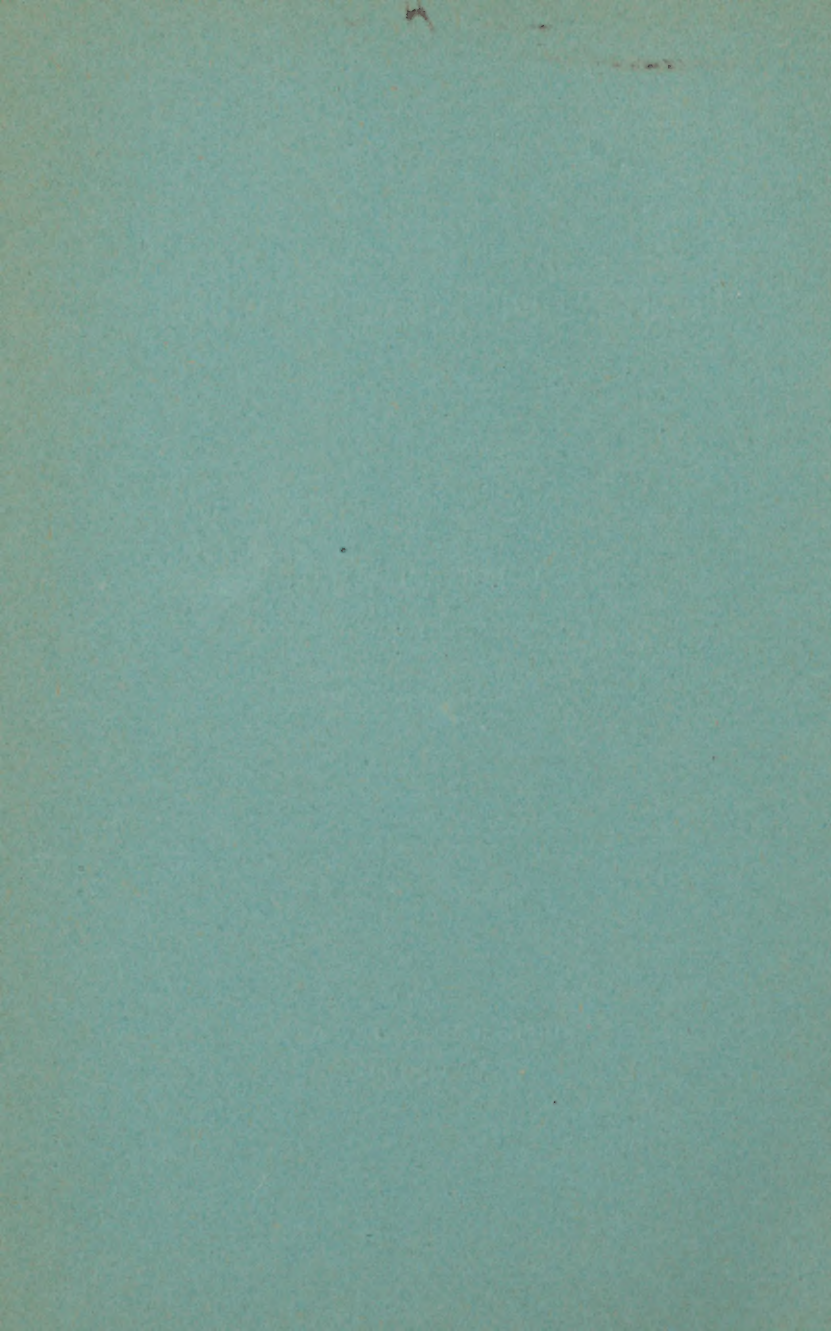
ORTHOPEDIC ASSOCIATION.

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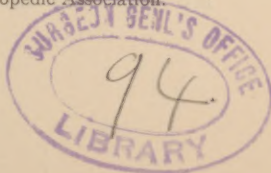
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LAST year, in my review of the orthopedic work of the late Mr. Thomas, I observed how rarely, if ever, he made use of plaster-of-Paris. I do recall one instance, however. It was when the wire cuirass that he suggests for the treatment of Pott's disease was shaped over a plaster cast of the patient's back. Doubtless, some convenient Italian was called in to do the work. Had Mr. Thomas's armamentarium been enriched with gypsum in its manifold applications, even he might have done better work and obtained still more brilliant results. Nor do those of like limited practice, as was his, realize what a valuable agent is to be found in this article for immobilizing joints, and for retaining parts of the body in improved position after forcible rectification.

The property of rapidly hardening, when once wet, gives to plaster its value. Additionally, it has merit in its cheapness and convenience. It is ever

¹ Read before the American Orthopedic Association.



ready, is easily prepared, and simple in its application. Its use renders the surgeon, in many instances, quite independent of the commercial instrument maker, a consummation devoutly to be wished, for the latter too often assumes the rôle of doctor, both advising and applying the remedy; without anatomic or pathologic knowledge, and too often without judgment, he applies a stereotyped machine, charges generous prices, and consumes for the patient golden moments, when correct treatment, directed by the intelligent surgeon, could have saved a limb or prevented a deformity in a child otherwise doomed to a life-long disfigurement. These proprietors of surgical-instrument shops are as culpable as the class of prescribing druggists. By their illustrated advertisements, and display of showy apparatus in shop-windows and at public fairs, the people are impressed with the idea that to them they should apply for relief. The profession itself merits a share of blame in this matter. Its members having cases of deformity too often very willingly turn them over to the instrument-maker for apparatus, without having any idea of what is best suited. In fact, having pocketed the consultation-fee, they are glad to get rid of cases about which they know but little, and with which they do not care to be troubled. The set appliances which these mercantile surgical-instrument men handle are very like the patent medicines which can be used without the aid of a doctor.

A better day, however, is now rapidly dawning, when the people, as well as the general profession, are beginning to understand that the successful

treatment of deformities, in their intricate and chronic peculiarities, requires the intelligent guidance of specially educated and experienced surgeons. The advanced work of this Association, in correctly educating the profession in these matters, is redeeming the poor cripples from the unprincipled hand of charlatan and mere mechanic.

Welcome! say we, to the intelligent and skilled artisan that can fashion the willing steel according to the ideas of the orthopedic surgeon. He becomes our right-hand man—like the pharmacist to the physician, valued when needed. It is, however, always better if the surgeon can do his own work, for he best knows what is required. Thus, the intelligent use of plaster-of-Paris often renders us independent of the machinist. With it we accomplish good results, and cheaply, too—economizing time and the patient's money. With its use there is no interruption of treatment for repair of broken braces, often a serious matter to the country practitioner far removed from the urban instrument-maker.

We, as surgeons, are largely wedded to methods that have been taught us and with which we are most familiar. Thus, a few orthopedists limit themselves to steel bars and leather straps, ignoring the use of plaster because unfamiliar with its manifold virtues. I, however, opine that all those now entering the orthopedic arena will, among other accomplishments, be expert in the use of the plaster bandage.

Those of us who employ this bandage differ in some of the minor details of its preparation. Thus

not a few prefer crinoline into which to rub the plaster, some previously removing its starch by washing. Individually, I prefer the so-called butter-cloth, Holstein brand. It is more open-meshed than the cheese-cloth, and nearly as much so as the crinoline, and its cost is one-half of that of the latter. Bought by the bolt, it may at once be cut into convenient widths at the bookbinder's, or in twenty-yard folds with a sharp cobbler's knife, on a cutting-board, against a steel straight-edge, or square. Three-inch and four-inch strips are none too wide for application to the trunk; they may be narrower for the limbs, and still more so for infant feet. These strips are cut in desirable lengths; here, again, longer for the trunk and shorter for the limbs. This can be done as each individual strip is being sprinkled with fresh dental plaster, which is most economically purchased by the half-barrel, and is also to be had in two-gallon covered tin buckets.

For preparing the bandage we may use any one of the ingenious plaster-bandage rollers found in the shops. But, if we do, we will probably return to the hand for sprinkling, rubbing, pressing, and loosely rolling the strip. This is best done on the table-top, entirely covered with a piece of stout wrapping-paper, which is afterward gathered up, and the loose plaster shaken into the large tin-bucket plaster-holder, then folded and put away for future use. With proper care no scattering of plaster need occur. For the same purpose, also, Doctor Weigel has devised a board with slightly raised sides, a box filled with plaster being attached

to one end, through which the bandage passes while being rolled off the board with the hand.

The rollers are put away into a tight tin can, and kept in a dry place until needed. When required for use they are soaked in warm water. As my own are tightly rolled, I keep three or four soaking during the application, always placing the last one in the water farthest removed from the hand, that they may be taken out in the order of their placing. A pinch of salt previously dissolved in the water hastens hardening when desirable, but increases the brittleness. I rarely employ it except when making moulds.

In applying the bandage, much tension should not ordinarily be used, as some unevenness thereby results, with consequent discomfort to the patient. Each round is made to overlap its predecessor one-half its width, and is rubbed smooth. Reverses are rarely required. The plaster is not applied directly to the skin—a shirt, a stocking, a flannel, or sheet-cotton bandage being interposed. A few moments suffice for hardening, when, as a result of the application, we have a firm, fixed dressing. Should it be desirable to remove it at once, a pencil-mark is made in the line of proposed separation, and with an ordinary pocket-knife a V-shaped groove is cut the whole length of the splint. By inserting the index-finger of the left hand under one end of the splint, the plaster, with the lining, can be completely divided without touching the skin; or a corset-steel may be passed under, next the skin, and cut down upon; or, preferably, an instrument such as I have devised may be used. This

consists of a small steel plate, half an inch wide and two inches long, fixed on its flat upper surface to a handle. This surface is plated with zinc, so that the knife-blade may not be dulled as it cuts down upon it.

FIG. I.



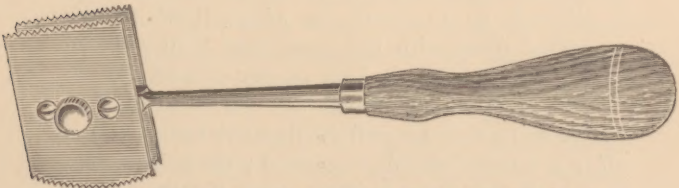
Skin protector ; used in cutting off plaster splints.

The plaster splint having been cut nearly through by a gutter-shaped incision, V-like, the flat blade of the instrument is slipped under the plaster next to the skin, and is cut down upon with a sharp

knife, and slowly advanced until the whole is divided.

A freshly-applied splint cuts readily, whereas an old splint may be so hard as to require softening. For the latter purpose nitro-hydrochloric acid was formerly advised, but it is unnecessarily strong, and might burn the patient's skin. I find vinegar, ever at hand, sufficiently strong to soften the plaster, which may be freely scratched with a knife-blade in the line of proposed incision, and the vinegar plentifully dropped on with a pipette. Very soon the plaster is sufficiently soft to be cut. Various shears and saws have been devised for dividing the plaster. One form of the latter, suggested by Dr. Meisenbach, consists of two equal-sized saw-blades, shaped like the Hey's saw, three-eighths of an inch apart, and parallel, and attached to a strong handle.

FIG. 2.



Saw, double-bladed or single-bladed, for dividing hard plaster.

In use it not only divides the plaster, but removes a strip, three-eighths of an inch wide, so desirable when the splint is to be reapplied, that it shall be tighter. Both plaster splints upon the limbs and plaster jackets upon the body become loose and fit less snugly after being worn awhile, from atrophy of the soft

parts. One of the blades of this saw can be removed by loosening the thumb-screw, shown at the side, and thus be used to make a single cut. It is unnecessary to soften the plaster when a saw is used. For dividing splints, however, I prefer a sharp pocket-knife, a little vinegar, and my skin-protector. Some fancy a hooked knife-blade shaped like a gardener's pruning-knife, but this cuts only on the point and is likely to wound the skin.

Fixed splints that have been made removable by cutting may be bound on the edges and fastened with hooks or buckles, or with an ordinary roller, and thus taken off and replaced at pleasure.

The plaster bandage is not only useful for making splints, but also for taking moulds of any part of the body. The part being covered with some light, snug-fitting stuff, the wet bandage, well soaked, is applied loosely, without tension, as otherwise ridges will be made and unevenness result. The bandage is allowed, so to speak, to adapt itself, and is smoothed down with the hands and gently forced into any depressions. Less plaster is used than in the case of a permanent dressing. In a few moments this incasing splint is sufficiently hardened to be cut off in a manner already suggested ; the shirt, stocking, or whatever was used to cover the skin being removed with it and becoming its lining. The more sleazy this material the better, for it adheres the more closely to the inner surface of the mould. While I so advise, yet it is not absolutely necessary that any material should cover the skin, for the plaster bandage may be applied directly to the part if previously well soaped or greased ; but in this

case so fine a surface is not given to the resulting cast.

After removal, the cut edges are nicely adapted and the mould is wound around with twine. So rapidly does the plaster dry that one may proceed directly to make the cast, or the mould may be laid aside for future use.

The line of union of the cut edges is stopped with fluid plaster applied to the outside, and, if it is a body mould that has been made, the lower open end is placed on a rough board and stopped around on the outside with plaster. Then ordinary commercial plaster, mixed with water in a large earthen bowl to the consistency of cream, is poured into the mould. This is to be repeated as often as is necessary until the mould is full.

If the cast had been made on a smooth surface—a table-top, for instance—the mould would not have adhered, but as the fluid plaster was poured in would have risen up, allowing escape at the bottom. The rough, sawed surface of a pine board affords strong attachment for the plaster, thus precluding such an accident.

If a cast of the trunk is being made, plaster can be economized and the cast made lighter by forcing down into the center of the fluid plaster round tin cans. Casts of limbs are made solid, and are strengthened by bundles of wire or several iron rods passed through them lengthwise. One end—the lower—is closed by tying over it rubber or other cloth previously to pouring in the plaster. In half an hour or more the plaster will have set sufficiently to allow removal of the outside mould. A sudden

force readily separates the cast from the board. The plaster that was used for stopping the line of junction is now chipped away, and the mould, with its lining, is easily peeled off, leaving the cast intact. There is rarely trouble because of the plaster of the cast adhering to the inside of the mould. Did one fear such a contingency, smearing the inside of the mould with lard previously to filling would prevent it. The cast requires pointing up, and if desirable, may be reshaped, adding here and taking off there; this is best done at once, while the plaster is still moist and comparatively soft. The thin and sharp blade of an old case-knife answers as a tool, though other instruments made especially for the purpose can be found in the shops, and are convenient.

Casts made as thus detailed answer all purposes except when great hardness and toughness are required—when, *e. g.*, they may be subject to the blows of a hammer as in shaping the wood and glue jackets. In such case finely picked tow is thoroughly incorporated into the fluid plaster, and the inside of the mould (probably of the trunk) is smeared all around with it to the thickness of three inches, more or less. On removing the outside casing or mould there remains a light but very tough cast.

Casts are desirable either for preserving the form of a distorted part or to furnish a basis over which to shape splints. There is scarcely a deformity that cannot be well taken in this simple manner, and I cannot too strongly urge the importance of obtaining and keeping casts of our deformed cases, especially the rare ones. They have a place in the history

of the cases and are valuable for illustration and instruction. None should be deterred from attempting to make them; the process is so simple and rapid that anyone may soon become an expert, whether the cast is made as above detailed or after the older methods of pouring fluid plaster directly upon the skin, previously well oiled or soaped.

Dr. Whitman, in making a cast of the foot, the toes excepted, suggests that thickly mixed plaster be poured upon a square of cotton cloth, and the outside of the foot be allowed to sink into it; the edges of the cloth are then raised until more than one half of the foot is covered; when this is hard, vaselin is spread on its upper surface, and the exposed portion of the foot covered with more plaster. When hard, the two halves are taken off, bandaged together, and the interior, previously oiled, filled with fluid plaster. The outer shell being removed, a cast is obtained of the foot.

A few words may be added as to the employment of the plaster bandage in various affections and in different regions of the body. Gypsum had been recommended by Mathiesen of Holland as early as 1852, as a convenient material with which to treat fractures, but the plaster bandage was first employed for the relief of a deformity in 1875, the affection being Pott's disease; and it still holds its place as an economical and efficient support to the body in spondylitis, especially of the lumbar and of the lower and mid-dorsal regions. The novitiate in its use finds trouble in the ulceration or excoriation of the skin that often occurs over the boss; to prevent the undue pressure and friction that cause this,

I cut an oblong opening in a sufficiently thick piece of boiler felt, and place it over the projecting spinous processes, care being taken that it does not shift as the bandage is drawn around and over it. Boiler felt also makes efficient pads for the hip-bones in adult patients. Usually the plaster jacket is made to extend above not higher than the axillæ; but if the disease is in the cervical or upper dorsal region, more thorough support can be obtained by carrying the bandage above the shoulders, like a vest. I cannot say whether or not I was the first to adopt this plan, now some twelve years since, but certainly support for three or four additional vertebræ can thus be had; and with the disease in the cervical region the bandage has been carried still higher, up the back of the neck and around the head. To additionally strengthen the jacket I fortify it with strips of galvanized-wire gauze, the size and strength of the strips depending upon the age of the patient; the corners are cut off and the edges bound with sticking-plaster. The plaster is better incorporated with the gauze than with perforated tin.

In lateral curvature a plaster jacket or corset gives support and comfort, but is not used as a corrective of the deformity.

The use of the plaster bandage has, within the past dozen years, almost revolutionized the treatment of club-foot. Through its aid we now do at one sitting what formerly required many weeks. Under an anæsthetic the foot is at once straightened, with or without tenotomy (according to the age of the patient), and so held by the plaster, a sheet-cotton roller having been previously applied to the part.

Here again I find valuable aid in a strip of wire gauze: a layer of plaster bandage having been placed over the foot and leg, one end of a narrow gauze strip is carried around the foot, and while it is forcibly held in corrective position, the other end of the strip is carried well up the outside of the leg and there fixed with additional rolls of the bandage.

In hip-disease, the joint may be quite efficiently immobilized by a plaster bandage carried well up on to the trunk and down to the lower third of the leg. This is a ready method for the country practitioner far removed from the instrument-maker, or when economy is necessary. This bandage, however, finds more suitable adoption in the immobilization of the knee-joint. The limb being covered with a long stocking or drawer leg, and the articulation surrounded by cotton, the plaster is carried well up on the thigh and down upon the leg, and fortified with metal gauze strips on the sides, thus affording a cheap and efficient splint. If, however, the patient is much on his feet, the splint tends to drop—to become displaced downward. This may be prevented by giving it support through a steel arm extending to the sole of the shoe, or it may be suspended by straps from the opposite shoulder. I have also to good purpose used a piece of adhesive plaster for fixing the splint to the skin of the leg at the time of application.

In disease and sprains of the ankle-joint, plaster finds frequent and admirable application, care being taken that the foot is put up at a right angle—not extended.

The gypsum bandage is applied to the elbow-joint

and the wrist-joint for immobilization, meeting well the indications. Care is exercised here, as wherever the plaster bandage is applied, that it is not wound around the part so tightly as to produce undue constriction and interference of the circulation, with consequent sloughing. The appearance of the part beyond the bandage, as of the fingers or the toes, will indicate danger by coldness, swelling, and discoloration, in which event the plaster should at once be cut off. A case of malpractice is now pending in our courts in which a doctor applied a plaster dressing to a boy's arm for a fracture extending into the elbow-joint, and extensive sloughing of the tissues of the forearm followed.

In both in-knee and out-knee, and in tibial curves after forcible manual correction or after osteotomy, the plaster splint holds the limb in the desired position until union takes place in the second case or accommodative changes have fulfilled the indications in the first. In manual correction of genu varum or valgum I change the splint every three or four weeks. In wry-neck, after myotomy and subsequent rectification, the bandage from a body-jacket is continued up the back of the neck and around the head, thus firmly holding the parts in the corrected position.

Having subcutaneously tapped a ganglion and scarified the interior of the sac with a spear-pointed instrument, like a couching-needle, and effectually expressed the contents, I apply a firm pad, and put up the wrist in a flexed position, with a plaster bandage extending down the forearm and includ-

ing the hand. Obliteration of the ganglion universally follows.

I might multiply the instances in which the gypsum bandage finds admirable and convenient application, but will rest with the suggestion, that as one becomes more expert in its use, the more often he will find occasion for it.

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